

## MODULE 8 MAINTENANCE OPERATIONS

Project Development Process

What we build.... Resonates through  
maintenance for years or decades.

Put yourself in the shoes of a maintenance technician working on your project some years down the road, it is pouring down rain, it is night time... traffic is a mess... have you set them up for safety and to be able to successfully maintain the assets designed for your project?

notes

# MANAGE SYSTEM ASSETS

- What do we do?
- Best way to utilize Maintenance expertise...?



- Maintenance and operation of over 20,000 lane miles (includes ramps, collectors and special use lanes), over 3,300 bridges, 1,100 traffic signal systems, 10 major mountain passes, close to 50 rest areas. These sites vital to the state's transportation system.
- Our job is to maintain the highway infrastructure in good working order, keep people safe, and goods moving 24-hours-a-day, 365-days-a-year.
- M&O staff are unique stakeholders since they utilize, maintain, and operate the facilities. Given the nature and cost of maintenance work, as well as the exposure inherent in maintenance and operational activities, it is important for designers to consider maintenance and operations staff as major stakeholders in every project.
- Superintendents, Supervisors and Lead Techs

Notes

## MANAGE SYSTEM ASSETS

- With Construction = New Asset
- Currently highway preservation:
  - \$665 M a year (need)
  - \$335 M a year (spending)
  - \$330 M a year (shortfall)
- Design in a way that minimizes cost of maintenance is desirable
- What kind of review would you like for your project?



Note that what we design will have to be maintained for years after it is built. We are building and releasing a new asset into our system... just for preservation on our highway system the average annual need is \$665 M a year, currently we spend \$335 M a year with a \$330M shortfall. (Source: 2020 State of Transportation)

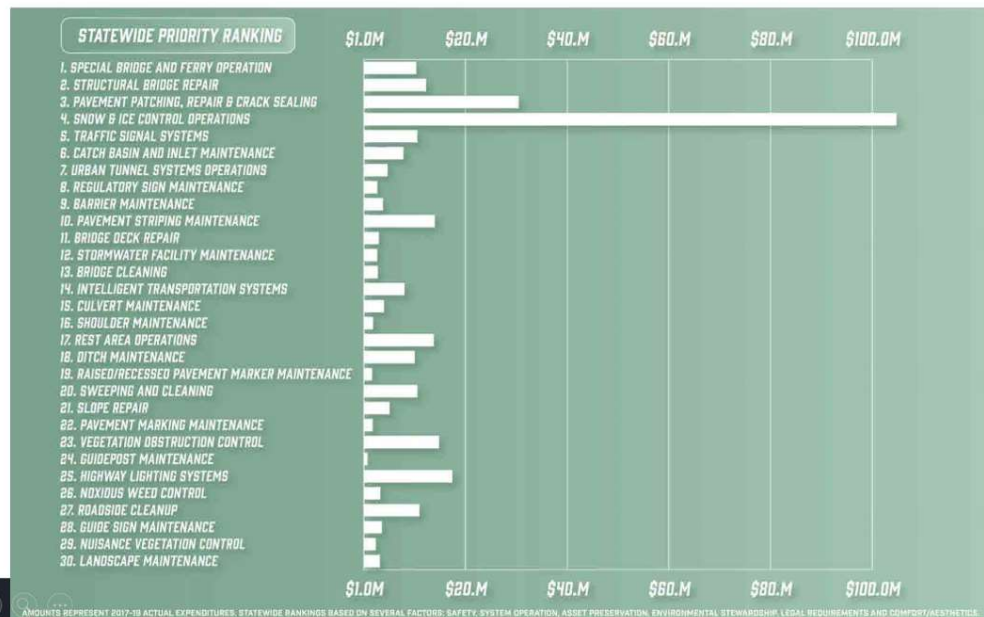
Designing in a way that minimizes cost of continuing maintenance is desirable.

Our customers are not just the Construction Office but also Maintenance, and the traveling public.

What kind of review would you like for the project you designed?

notes

## **2019-2021 State Maintenance Priority Activities**



- Amounts represent 2017-2018 Actual expenditures, Statewide rankings based on several factors: Safety, System Operation, Asset Preservations, Environmental Stewardship, Legal Requirements and Comfort/Aesthetics.

Notes

# THE SAME TEAM

## Top 5 TO-DO with Maintenance

1. Communicate!
2. Involve
3. Consult
4. Identify
5. Grab low-hanging fruit (if you can)



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1. Communicate
  - Nothing is more important
  - We all have different personalities, all have to make every effort to create a successful working environment, and this is part of the WSDOT Strategic Plan!
    - Inclusion, Practical Solutions and Workforce Development. 4-Lens Training
  - Breakdown the Barrier!
    - Pre-design discussion and site visits with maintenance creates dialog and experienced insight for a given area.
2. Involve Maintenance in the scoping phase
  - They can help answer questions related to pedestrian and bicycle traffic since they receive complaints related to the current system.
3. Consult Maintenance during the design phase
  - Placement of catch basins and drains.
  - Design access to systems that need to be maintained.
    - Access to retention ponds or fish conveyance systems. Is there a place to unload mowing equipment?
  - Access points to traffic cabinets and junction boxes are important and need to be kept away from traffic.
  - They can provide important feedback about invasive vegetation management (IVM) to keep growth from incriminating the roadway.
  - Homeless encampments need to be considered for a variety of reasons and Maintenance can provide feedback as to whether an option is viable.
4. Identify anything that might be outside of normal maintenance and communicate what the need may be.
  - A recent project was completed by Western Federal Lands. The installation of guardrail occurred at a point in time where older standards were allowed. As a result, the need to purchase special guardrail components will be needed in order to meet newer regulatory standards.
  - Safety is a high priority, so is reducing traffic impacts, but have you considered the cost to WSDOT for using one type of attenuator versus another?
5. Check if you can grab low-hanging fruit
  - Maintenance might be able to do some P-3 (other facility maintenance to include slope, drainage & electrical) work prior to a contract P-1 project, if no P-3 funds attached.

|   |  |
|---|--|
| <h2>Create a communication plan</h2> <p><b>Maintenance Communication Plan</b></p> <p><small>Instructions: Use WSDOT webpages to find your maintenance contacts and Design Manual Chapter 301 to fill in the following blanks. (also see Maintenance Manual)</small></p> <ol style="list-style-type: none"> <li><b>Who</b> are you communicating with?<br/>Maintenance Superintendent Name:<br/>Maintenance Supervisor:<br/>Lead Maintenance Technician:</li> <li><b>What</b> will you communicate?<br/>Intent of the Project:<br/>Request for unknown/reoccurring issues present within project limits:</li> <li><b>When</b> does the communication need to occur to maximize effectiveness?<br/>Planning &amp; Scoping phases provide best opportunity to outline project needs; sustain communication to identify needs, consider alternate strategies, and refine solutions</li> <li><b>Where</b> will the communication take place?<br/>Office meetings are often great places to <u>initially meet</u> to discuss planning and scoping, however; a field review of the project limits will often provide opportunity to understand natural and artificial features that might affect the project.</li> <li><b>How</b> will you respond to communication?<br/>Building constructive and continued relationships with the people you are working with is vital for success of any project. This is done through engaged, consistent, attentive and confident communication.</li> </ol> <p><small>WSDOT 6</small></p> | <h2>Exercise</h2> <p>Walk through questions on template communication plan. Pose each question to the group. Allow one minute for folks to write on their copy in between each question.</p> |
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| <p>notes</p>  |  |

# MANAGE SYSTEM ASSETS

A simple roundabout?

## Storm Drain Line

|                                 |       |    |
|---------------------------------|-------|----|
| 12" Conc. Pipe                  | 1,954 | LF |
| 12" HDPE Pipe                   | 256   | LF |
| Catch Basin, Type 2             | 3     | EA |
| Catch Basin, Type 1             | 43    | EA |
| Beveled End Section             | 9     | EA |
| Luminaire                       | 15    | EA |
| Type 1 Junction Box             | 12    | EA |
| Type 2 Junction Box             | 4     | EA |
| Type B Modified Service Cabinet | 1     | EA |
| Cable Vault                     | 2     | EA |
| Pull Box                        | 5     | EA |
| Type 2 Wire Fence               | 50    | LF |
| Type 2 Wire Fence Double Gate   | 1     | EA |
| Sign                            | 69    | EA |
| Cement Concrete Sidewalk        | 2,036 | LF |
| Bio-Infiltration Swale          | 3     | EA |
| Infiltration Pond               | 1     | EA |
| Storm Drain Inlet Protection    | 43    | EA |
| Check Dam                       | 2     | EA |
| Guide Post                      | 66    | EA |

## Thermoplastic Pavement Markings

|                                   |    |      |
|-----------------------------------|----|------|
| Crosswalk                         | 32 | Bars |
| Right Turn Arrow                  | 4  | EA   |
| Through Arrow                     | 2  | EA   |
| Roundabout Traffic Arrow Type LC  | 2  | EA   |
| Roundabout Traffic Arrow Type T   | 4  | EA   |
| Left Turn Arrow                   | 1  | EA   |
| Roundabout Traffic Arrow Type TR  | 1  | EA   |
| Roundabout Traffic Arrow Type LTC | 5  | EA   |
| Through/Left Turn Arrow           | 3  | EA   |
| Type 2 Yield Line Symbol          | 31 | EA   |
| Bicycle Lane Symbol               | 2  | EA   |
| Detectable Warning Surface        | 16 | EA   |

notes

## MULTIMODAL PROJECT DEVELOPMENT MAINTENANCE

The construction project is done, our new asset is built and in place – now we need to maintain and operate it for the next 50 years – what is the first thing we do in maintenance?



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Maintenance oversees the day-to-day needs of maintaining the state highway system, including lanes, ramps, bridges, traffic signal systems and rest areas. Maintenance processes permits such as Adopt-a-Highway and permits, as well as maintenance tasks like snow plowing, bridge openings, vegetation removal, etc.

Things that Maintenance does when a project is complete:

- Define what all the assets are
  - This includes safety features, retention ponds, drainage, structures, vegetation, etc.
- Determine if all the assets have been installed correctly
- Find out if manuals for maintaining the newly installed assets (for the owner) are needed and/or have been supplied
- Make corrections to any improperly installed assets.
- Map assets and document attributes (types, class, properties, etc.) for future maintenance activities and level of service (LOS) measurement

The following slide is an example of two different assets (wetland and fish passage) that need attention post-construction.

notes



# MONITORING SYSTEM ASSETS

## Wetlands

Submit a monitoring start-up form to notify the Wetland Program to begin monitoring as construction of compensation sites is completed, including as-built plans.

## Fish Passage

Notify ESO's Stream Restoration Program to begin monitoring as soon as fish passage project construction is completed, and provide as-built plans.



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## Wetlands

Submit a monitoring start-up form to notify the Wetland Program to begin monitoring as construction of compensation sites is completed, including as-built plans. State and federal agencies typically require compensation site monitoring to ensure the site meets permit requirements.

## Fish Passage

Notify ESO's Stream Restoration Program to begin monitoring as soon as fish passage project construction is completed, and provide as-built plans. State and federal agencies require post-project fish passage monitoring to ensure the site meets permit requirements and the Culvert Injunction requires post-project monitoring.

**Due to the assets that need to be managed post-construction, it is imperative that good communication takes place during the scoping and design phase.**

notes

# IDENTIFY NEEDS



## Chapter 301 Design and Maintenance Coordination

### Communicate!



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- Communication is the most fundamental component of plan development.
  - Share a time with your partner when you identified a problem
  - Who are you communicating with? Superintendents and supervisors
  - What methods of communication are you using? Phone is best and follow up with e-mail. Even show up in person!
  - What is being communicated? Needs, direction, clarification (example: sinking road sections, project office to fix and didn't know what was causing it)
  - How are you responding to communication? Relationship building – build trust
  - Where is the communication taking place? Site visit.
  - When does the communication need to occur to maximize effectiveness? Identify needs during initial scoping from maintenance. A good idea to check in with maintenance when outlining needs of project –what do we want to do? Is there anything else we need to consider before deciding scope.
  - Maintenance staff should never be in a position to review project details from a plan sheet without a meeting/discussion, examples, or other means of communicating what feature or issues they are reviewing on the plan sheet. This effort will help ensure there are “no surprises” for maintenance and operations staff when the planned project enters construction.
- All these simple questions are covered in the Design Manual, specifically Chapter 301
- This is a major chapter that that cannot be overlooked
  - Is the roadway experiencing any reoccurring maintenance issues? Are there drainage concerns? What other problems are present that may not be known?
    - The answer to these questions can usually be found when speaking with a Maintenance Area Superintendent or one of their Supervisors.
- **Superintendents, Supervisors and Lead Techs**

notes

# IDENTIFY NEEDS



- A recent review of guardrail was completed and involved WSDOT and FHWA. The following were some of their initial findings:
- Guardrail - Buried in Backslope
  - FHWA has reinforced their support position that Buried in Backslope is the preferred approach.
  - Several were observed and generally well designed and constructed.
  - Height was well maintained and a rub rail properly used.
  - Finding that installations are within specification with respect to design and construction approaches at WSDOT and our contracting community.

Notes

# ASSESS ALTERNATIVE STRATEGIES



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- What is being planned?
- Communication – When the project is over, Maintenance & Operations is left with what remains
- Photo represents the North Spokane Corridor, NSC
  - Added 30 lane miles, 500 drainage features, ~8 miles of drainage ditches, 12 new bridges, 225 acres of weed and litter control, guardrail barrier, ITS (11 cameras, 3 VMS), etc.
  - **This requires more than \$500K annually to maintain (guardrail maintenance, snow plowing, vegetation management).**
  - Once we build the beast – someone has to feed it and care for it.

notes

# REFINE SOLUTIONS



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- What is being planned?
- How can access to a simple Signal Cabinet impact maintenance and operations?
  - Consider where crew members will have to park. Will they have nearby parking access that is safe or will they have to haul tools and equipment a long way?
  - Safety is paramount...the more room to work, the less likely accident or injury is to occur.
  - Designing a location that is easy to access and allows for personnel to safely perform maintenance, the more efficient the work is likely to take place.

Notes



# REFINE SOLUTIONS



- Where **elaborate plantings** are included in roundabout construction, ongoing maintenance is **labor intensive and expensive**, and this work is a low priority for highway maintenance.

notes

# IMPLEMENT SOLUTIONS



- Unless WSDOT can arrange for ongoing maintenance with local (public or private) resources, the most practical solution for these center areas is hard surface or rock/xeriscape solutions with minimal vegetation.

## Definition of *xeriscape*

: a landscaping method developed especially for arid and semiarid climates that utilizes water-conserving techniques (such as the use of drought-tolerant plants, mulch, and efficient irrigation)

Notes

# IMPLEMENT SOLUTIONS

Final Records for Projects Constructed by Contract

Track long-term environmental commitments made during design



- Punch List
- **This simple list circles back to the beginning of this module and back to Managing System Assets.**
- It's a pretty simple process that can be quite costly if not done correctly.
- Simply put...Communicate!

Notes



# notes